How To Light Your Home By Electricity

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THE ELECTRIC STORAGE BATTERY CO.
PHILADELPHIA

MANUFACTURER OF

The "Chloride Accumulator" The "Tudor Accumulator"
The "Exide" Battery

PHILADELPHIA—Allegheny Avenue and Nineteenth Street
NEW YORK—100 Broadway
BOSTON—60 State Street
CHICAGO—Marquette Building
ST. LOUIS—Fullerton Building
CLEVELAND—Citizens Building
DENVER—1424 Wazee Street
DETROIT—Ford Building
ATLANTA—Candler Building
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PORTLAND, ORE.—Spalding Building
LOS ANGELES—Pacific Electric Building
CANADA—The Canadian General Electric Company, Ltd., Toronto

YOUR interest centers about your home. You are always glad to familiarize yourself with those modern appliances which give comfort to your family or friends, and which are matters of pride to yourself.

Illumination

¶ There is no subject to which you should give more attention and real serious consideration than the illumination of your home. The proper lighting of a house adds very much to both its comfort and its appearance.

¶ Illumination has gone through many stages of development. The earliest forms of lighting, the pine torch, the candle, the kerosene lamp, bear a marked contrast to the modern electric light.

Electric Lighting

¶ With the introduction of electricity came the greatest step in advance. The use of matches and the consequent fire risk, the annoyances of filling and caring for lamps, the breakage of chimneys and parts, the prevalence of smoke and disagreeable odors, the vitiation of the air, inseparable from both oil and gas lights, have all been eliminated by electric lights.

¶ However, as is usually the case with the introduction of improved appliances, the cost of apparatus for generating electricity and the large amount of it required for lighting a home, limited its earlier use either to those who could afford the expense of installing and maintaining a large and elaborate plant, or to those who lived within reach of a public electric lighting station.

The Tungsten Incandescent Lamp

¶ The rapid strides of progress made in electric lighting have entirely changed the complexion of the problem of small lighting plants. The Tungsten incandescent electric lamp, recently introduced, and now so universally used, the latest and highest development of the lamp maker's art, gives a pure white light of unequaled brilliancy. This lamp has made it possible to obtain the same amount of illumination formerly afforded by the ordinary, or carbon filament lamp, with about one-third the electricity. The Tungsten lamp will wear longer than the old style lamp and maintains its full brilliancy during the greater part of its life. It is also less sensitive to the variations in pressures of electricity, and therefore its use requires less complicated and expensive apparatus.

Reduced Cost of Electric Lighting

¶ The reduction in the amount of electrical energy required per Tungsten lamp has brought about a proportionate reduction in the cost of generating and storing electricity, so that now the many advantages to be gained from the various uses of electricity are within the reach of all those of very moderate means. The country resident or farmer, situated at a distance from a public electric lighting station, is now able at very

small expense to install and operate his own electric lighting plant, which will furnish him with ample light for his home, stables and other outbuildings, and with electric power for such purposes as are later described.

Advantages of Electric Lights

¶ The varied uses of electricity, its convenience, the saving it effects in time and labor and the elimination of fire risk are worthy of special mention. Small electric lamps placed in closets, in dark corners, in cellar or attic are very convenient. These small electric lights take the place of oil lamps and candles, whose light is unsatisfactory, and the use of which is inconvenient and dangerous.

¶ Particularly applicable to electric illumination is the lighting of stables and barns. The use of lanterns in and about barns and similar places has been the cause of numberless fires and the destruction of millions of dollars worth of property, as it is seldom that the country home has available apparatus for successfully fighting fires.

Other Uses for Electricity

¶ The use of electricity is not limited alone to lighting. Feed choppers, cream separators, harvesting machinery, etc., can all be most satisfactorily operated by electric motors. There are many other uses for it, such as the electric flat iron, which takes from the housewife the dread of ironing day, the electric fan for hot summer days, the small electric motor which operates sewing machines, washing machines or vacuum cleaners, numerous small cooking devices, which for breakfast or suppers often take the place of the coal stove.

¶ Abundance of light and the conveniences of electricity can no longer be classed as luxuries. The

better light afforded for reading and working, the purer condition of the air, the labor saving of electric motors, the reduction in fire risk have made electricity well nigh a necessity in every country home.

A Lighting Plant

¶ An electric lighting plant, such as is described in this book, consists of an engine, dynamo, storage battery and switchboard.

The Engine

¶ The first consideration in installing an electric lighting plant for the class of service under consideration is a source of mechanical energy for the operation of the dynamo. The many improvements made in the gasoline engine during the past few years have made it the most feasible source of power for this purpose. A gasoline engine of standard manufacture adapted for house lighting plants is absolutely reliable, very economical in the consumption of fuel, is easily kept in order and does not require either constant or expert attention. Such an engine will not smoke or smell, and a muffler is attached to the exhaust pipe so that it is practically noiseless while running. The engine can be started when desired and left to run as long as may be required, it not being necessary to watch or care for it while in operation.

¶ Country residents or farmers often have an engine for running a pump or other farming machinery, which, if of suitable design, can be utilized for running the dynamo, thus saving a very considerable part of the cost of the lighting equipment.

The Dynamo

¶ The source of electricity for a lighting plant is the electric dynamo. Machines are furnished which are thoroughly reliable in operation and require practi-

cally no attention. The dynamo is connected to the engine by a short belt. The wires running from the dynamo deliver the current to a switchboard, and from it to the storage battery and to electric lights or motors which may be in use for operating various machines. These dynamos deliver current at so low a pressure that there is no danger of an unpleasant shock from them.

The Switchboard

¶ The switchboard for these lighting plants is a small panel mounted on iron supports, and on it are fastened the simple apparatus for controlling the current.

The Storage Battery

¶ The engine develops mechanical energy, which is transformed into electrical energy by the dynamo. The storage battery acts just like a water tank; it is a reservoir which stores electricity to be supplied whenever needed, so that it is unnecessary to run the engine and dynamo continuously in order to have electric light at all hours of the day and night.

¶ The length of time which an engine must be operated and the frequency of operation are determined by the size of the storage battery and the amount of electricity required for the operation of lamps or motors after the engine is shut down. Storage batteries are furnished that require charging once each day, larger batteries require charging only once in two or three days, and others still larger will store current for a week or more. Batteries require an engine to be run from four to ten hours to charge them, the time depending upon how much electricity has previously been used from the battery.

¶ A storage battery of the type used for small lighting plants is made up of a number of glass jars in which are suspended properly prepared lead battery

plates, the jars being filled with an acid solution called the electrolyte. The jars and plates compose a cell. The cells are placed on trays on a rack, or set of shelves, usually of two tiers. A battery for the fifteen light plant described in this book consists of nineteen cells, which may be arranged on two substantial shelves, one above the other, each shelf being about two and one-half feet long and one foot wide, with head room of two and one-half feet. A larger battery would be installed on a two tier rack, occupying a floor space of about nine feet by one foot and six inches.

¶ The complete lighting plants are usually set up in a corner of a basement or outhouse. A small plant occupies a space approximately six feet square, but where such space is not available the battery can be placed at a short distance from the engine and generator.

House Fixtures

¶ The design and cost of lighting fixtures varies considerably. Fixtures can be purchased of very elaborate style or inexpensive fixtures can be procured which answer every purpose as well as the costly forms and at much less expense.

Wiring

¶ The cost of wiring a house varies considerably, due to the different methods employed in installing the wires. If it is desired to have all the wires out of sight, they can be run between partitions, and outlets made in the ceilings or walls at desired places. This is known as the concealed method of wiring. Wires can be run in wooden moldings, which are painted to match wood work, and therefore are not con-

spicuous. This is known as the molding method of wiring. In cases, however, where the appearance of wires is not objectionable, as in barns, stables, cellars or attics, the exterior or exposed method of wiring considerably reduces the expense. Wiring, where there are approximately ten or more lights to install, can be done at from $2.00 to $2.50 per light, which includes wire, lamp socket and lamp and all necessary material except the fixture.

Sizes of Electric Lamps

¶ Economy in the amount of electric current consumed can be very materially effected by the use of various sizes (candle power) of Tungsten lamps. For libraries or parlors, where brilliant illumination is desired, lamps of high candle power can be used. In bed rooms, halls or kitchen, lamps of medium candle power, while in cellars, attics or closets smaller lamps are equally satisfactory, and their first cost and the amount of current they require is less. Tungsten lamps are furnished in a number of sizes, designated as 8, 12 and 16 candle power lamps.

Simplicity of Lighting Plants

¶ The apparatus required for lighting plants is in no way complicated. The slight knowledge required for the installation and operation of a lighting plant can be readily learned from the simple instructions furnished with each plant, and is not so great as that the owner of an automobile must have who drives his own car or a farmer who operates a threshing machine.

¶ The object of this book is not to give a technical description of each piece of apparatus required, but rather to lay before the owner of a home the advantages of an electric

View of a typical installation of an electric lighti
barn, pump house and tool house. The electric

ant on a farm, showing the lighting of the dwelling,
ting plant is set up in a corner of the tool house

lighting plant, the apparatus required, its approximate first cost and the cost of its operation.

Cost of Plant

¶ Electric lighting plants can be furnished for any number of lamps that may be desired. The cost of a plant will vary with the number of lamps that are burned, but an approximate idea of the expense involved is given. As an illustration, a lighting equipment suitable for an ordinary sized home requiring the installation of from fifteen to twenty lamps, consists of a small gasoline engine with a suitable generator, a storage battery of "Chloride Accumulators" and a small switchboard, and can be purchased for approximately the sum of $400 f. o. b. shipping point. This price includes a complete plant with the exception of incandescent lamps, fixtures and wiring.

Cost of Installing

¶ The cost of installing this plant, including freight, labor, incandescent lamps and wiring, with the exception of fixtures (chandeliers), would be approximately from $75 to $125. The storage battery of this plant would be of sufficient size to furnish the evening lighting, morning lighting when desired, and for supplying one or two lights during the night in case of illness, or for some other purpose, as is described in the next paragraph. At other hours of the day, any considerable amount of light or power would be taken direct from the dynamo.

Service Derived

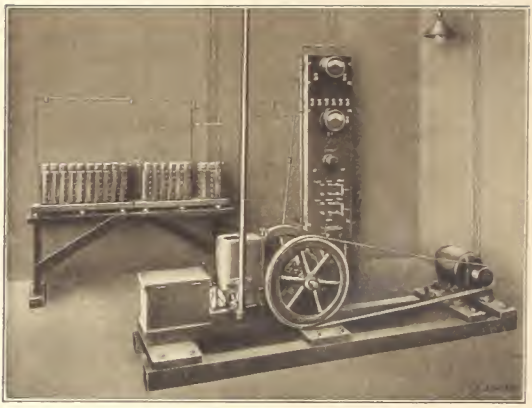
¶ The battery alone in this lighting plant will furnish sufficient electric current to light a home where approximately the following number and sizes of lights are used and burned about as follows: In the dining room two 16 candle power lights are burned during the

morning and evening meals for one hour each. In the living room two 16 candle power lights are burned in the evening for three hours. In the kitchen one 16 candle power light is used two hours in the morning and four hours in the evening. In the front and rear halls one 8 candle power light is burned one hour in the morning and five hours in the evening, and one 8 candle power light on the front porch two hours in the evening. There are three bed rooms, each having one 16 candle power light burning one hour each day. In addition to these lights, there are four 8 candle power lamps, located in cellar, attic, pantry, etc., which, however, are only burned occasionally and for short periods of time.

¶ If all these lamps were kept burning the full number of hours specified, the engine would require operating for a few hours each day to charge the battery. However, under normal living conditions all of these lights would not ordinarily be burned for the lengths of time specified, and therefore it would usually not be necessary to run the engine except

ing every other day, and in summer, perhaps, not oftener than once in three days. If at any time there should be a demand for an extraordinary amount of light, the dynamo and battery may be used together, giving a capacity of twenty 16 candle power lamps. If desirable, a larger battery could be used with this same engine and dynamo, which would furnish more lights or make it necessary to run the engine less frequently.

¶ The above estimate is based on the use of 8 and 16 candle power lamps. Lamps of other sizes, however, could be substituted, and the distribution of lamps could be changed to suit conditions, provided, only, that the total amount of light used remains approximately the same.



A 15 to 20 Light Plant, consisting of Engine, Dynamo, Storage Battery and Switchboard

Operation of the Engine

¶ The running of the engine for charging the battery can be done at any convenient time. In cases where current is also furnished for electric motors for operating cream separators, pumps, washing machines, etc., which are used during the day, the engine is usually run while the motors are being used, during which time the battery is also charged, so that after the motors have been shut down the electricity stored in the battery is ready for furnishing lighting at other times. On special occasions, such as parties or receptions when it is desired to burn all the lamps continuously, the engine can be kept running and the electricity generated by it, together with that previously stored in the battery can be united and the plant will then furnish ample current for special illuminations.

Cost of Operation

¶ The operating cost of an electric lighting plant is practically covered by the cost of the fuel required to run the engine. A one horse power gasoline engine will cost about 2¼ cents per hour for gasoline, running at full load, assuming gasoline to cost 18 cents per gallon. This means that electric lighting can be supplied where fifteen lights are installed for from 4 cents to 8 cents per day, depending upon the amount of light used.

¶ These electric light plants have been so perfected that reliable operation is assured. They are so very simple that anyone can set them up and operate them who will follow the complete directions furnished with each outfit. All parts of the equipment are carefully tagged and numbered so that the plant can be set up and the wiring connections made with little chance of mistake.

¶ The only special skill that might be required is that of an electrician to do the house wiring, install the fixtures and to be certain that all connections have been properly made. This Company is always in close touch with electrical dealers in all parts of the country and can refer customers to a reliable contractor.

The Importance of the Battery

¶ The storage battery is without doubt a most important part of a lighting plant, since it does all the work while the engine is not running, and it is therefore very necessary that every consideration be given it.

¶ The Electric Storage Battery Co. is the oldest and largest manufacturer of storage batteries, having had twenty-five years of experience in the manufacture of storage batteries alone.

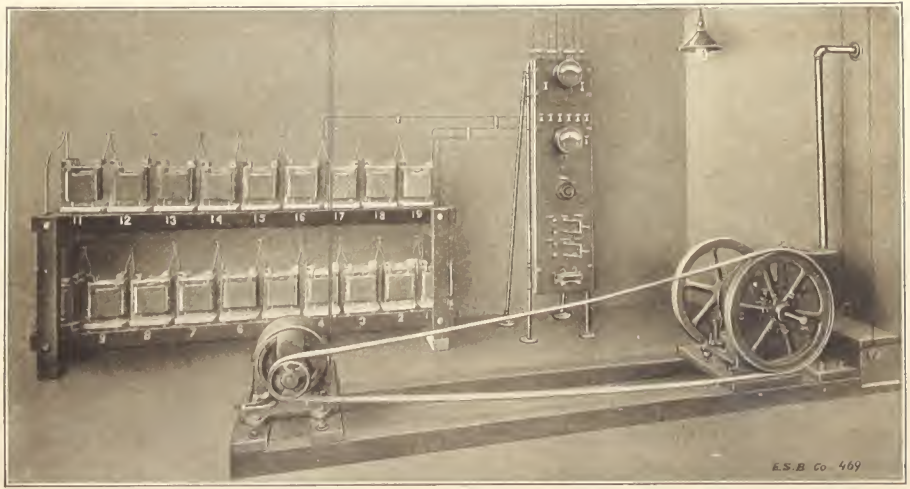


Illustration showing a typical installation of an Electric Lighting Plant for 35 or more lights, consisting of Engine, Dynamo, Storage Battery and Switchboard

The "Chloride Accumulator"

¶ This Company, during its years of experience, has developed a type of storage battery known as the "Chloride Accumulator". This battery is made in many sizes to suit many conditions. The type of battery furnished by The Electric Storage Battery Co. for small lighting plants is of the same general design as that it has supplied for years for the largest central lighting and power stations in the country. The successful operation of this storage battery, the "Chloride Accumulator", is proven by the fact that it is used in over 150 large and small lighting installations throughout the country. The New York Edison Co., operating 42 batteries of this type, the largest storage battery lighting installation in the world, has used this battery exclusively since 1898. This battery is also used by the lighting companies in Chicago, Boston, Philadelphia, Brooklyn, Detroit, St. Louis, etc. It is also used by the leading electric railways, by a majority of the steam railroads using batteries for car lighting and signal service, in over 1,000 telephone exchanges and for scores of other purposes. There are over 1,000 installations of this battery in office buildings, public institutions, residences, colleges, etc., which are performing the same service as is required of a battery in a lighting plant such as described in this book. The "Chloride Accumulator" is used both by the Western Union and Postal Telegraph Companies. The Wireless Telegraph Systems of the Marconi and the United Wireless Telegraph Companies and the submarine boats of the United States Navy, two of the latest practical developments of science, both derive electrical energy from equipments of batteries made by The Electric Storage Battery Co. A striking evidence of the reliability of this Company's product is the pre-

dominance of the use of one of its types of batteries for propelling electric vehicles. Over 90 per cent. of all electric vehicles manufactured are equipped with a battery of The Electric Storage Battery Co.'s manufacture, known as the "Exide" Battery.

¶ The various services required from different electric plants make it advisable for this Company to be perfectly familiar with each installation, so that it can advise as to the most suitable type of plant to be used. In order, therefore, to be certain of best serving the interests of customers, there is printed on the last page of this book an information sheet, the page having been perforated, so that after the necessary information has been written in, it can be torn out and mailed. Upon its receipt, it will be given prompt attention and customers will be given complete information and prices.

¶ Electricity offers the most reliable, safe and efficient form of illumination, and now that its cost has been so greatly reduced and a lighting plant so simplified, it cannot help but appeal to every owner of a home where current from a public lighting station is not available.

Form 771 9th E—1-'13—15M

INFORMATION SHEET

If you will fill out this sheet, answering fully each question, sign it, giving your name and full address, tear it out and mail it to the address of the nearest sales office given in the front of this book, we will send you full information and prices on an Electric Plant to answer your special requirements.

1. Specify the hours A. M. or P. M. during which it would be most convenient to run an engine for charging the battery. (See page 7, line 32.)

Ans. From _____ to _____ A. M. or from _____ to _____ P. M.

2. Would you desire to operate motors, and if so, (*a*) How many? (*b*) What horse power? (*c*) For what purpose would each one be used? (*d*) For how many hours each day would each be used? (*e*) During what hours each day would each be operated?

Ans. (*a*) _____ (*b*) _____

(*c*) _____

(*d*) _____

(*e*) _____

3. Would current be required for either lights or motors during the time the storage battery is being charged?

Ans. _____

4. Have you (*a*) A gasoline engine, steam engine or water motor? If so, give us (*b*) Size in H. P.; (*c*) Diameter of fly wheel; (*d*) Diameter of driving pulley; (*e*) Width of fly wheel; (*f*) Width of driving pulley; (*g*) Width of belt; (*h*) Name of manufacturer; (*i*) For what purpose now used; (*j*) Speed; (*k*) Hours now in operation.

Ans. (*a*) _____ (*b*) _____

(*c*) _____ (*d*) _____

(*e*) _____ (*f*) _____ (*g*) _____

(*h*) _____

(*i*) _____

(*j*) _____ (*k*) From _____ to _____

5. Give the (*a*) Number of electric lights you would require for your house and barn; (*b*) State how many 16 candle power lamps; (*c*) How many 8 candle power lamps, and (*d*) Give the hours of the day or night each separate light would be burned, by carefully filling in the table on the other side of this sheet.

Ans. (*a*) _____ (*b*) _____

(*c*) _____

6. Have you (*a*) A dynamo? If so, give us (*b*) K. W. capacity; (*c*) Voltage; (*d*) Amperage; (*e*) Speed; (*f*) Approximate surplus capacity; (*g*) Open or enclosed type; (*h*) Hours now in operation.

Ans. (*a*) _____ (*b*) _____ (*c*) _____

(*d*) _____ (*e*) _____ (*f*) _____

(*g*) _____ (*h*) From _____ to _____

INFORMATION SHEET—Continued

The table below is for answering part (*d*) of question 5. In filling in this table, take, for example, an average winter day when lights would be needed for the greatest number of hours. This information is necessary so that a plant of ample capacity can be furnished. Take each separate hour of the twenty-four and write in the proper space the total number of lights of each size that would be burned during that particular hour.

HOURS OF DAY AND NIGHT	A.M. 4-5	A.M. 5-6	A.M. 6-7	A.M. 7-8	A.M. 8-9	A.M. 9-10	A.M. 10-11	A.M. 11-12	P.M. 12-1	P.M. 1-2	P.M. 2-3	P.M. 3-4	P.M. 4-5	P.M. 5-6	P.M. 6-7	P.M. 7-8	P.M. 8-9	P.M. 9-10	P.M. 10-11	P.M. 11-12	A.M. 12-1	A.M. 1-2	A.M. 2-3	A.M. 3-4
16 Candle Power Tungsten Lamps																								
8 Candle Power Tungsten Lamps																								

REMARKS: .....
(This space is for giving any additional information or for asking any questions.)

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.....

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NAME .....

CITY .....

STATE .....

R. F. D. No. .....